Remarks/Arguments

Claims 1, 5-10, 13, 14, 16-23, 27, 28, 33-34, 36-43 and 50-60 were pending in the application. Claim 10 has now been cancelled. Applicants thank the Examiner for withdrawal of the following rejections: (1) claims 5, 18, 20, 21, 27, 38, 41 and 42 under 35 U.S.C. 112, second paragraph, as being indefinite; (2) claims 1, 5-10, 12-14, 18-23, 27-30, 32-34, 38-41, and 44-45 under 35 U.S.C. 103(a) as being unpatentable over Pullman (U.S. Patent No. 6,492,174) in view of Handley (U.S. Patent No. 5,491,090); (3) claims 4 and 26 under 35 U.S.C. 103(a) as being unpatentable over Pullman in view of Handley, and further in view of Schuller (Plant Cell Reports (1993) 12:199-202); and (4) claims 16, 17, 36 and 37 under 35 U.S.C. 103(a) as being unpatentable over Pullman in view of Handley, and further in view of Coke (U.S. Patent No. 5,534,433).

Interview Summary

Applicants also thank the Examiner for the courtesies extended in the telephonic interview with Dr. Stephen Attree, Tambryn VanHeyningen and Charles Laff on October 18, 2007. In the interview, Dr. Attree described the steps in the process of somatic embryogenesis. He delineated the distinct functions of each step in the procedure and noted the distinct culture media characteristics required at each of the steps. As explained by Dr. Attree in the interview, the first step in somatic embryogenesis is induction or initiation in which the embryogenic cell or tissue is formed from somatic (non-sexual) tissue of the plant. The somatic tissue must de-differentiate and begin proliferating. The second step is maintenance or proliferation and the goal of this step is to allow the cells to proliferate as much and as fast as possible. The embryos

do not mature in this medium. The third step is optional, is called preculture or prematuration, and is meant to provide a gentle transition for the cells from proliferation in the maintenance phase to development and differentiation in the maturation phase. The maturation or development phase requires that the cells stop proliferating and start differentiating to develop into a mature embryo that is capable of germinating like a seed. Finally, maturation is complete and germination is triggered by transferring mature embryos to yet another medium in which the embryo germinates to form a seedling. Each step in the process is unique and requires different media and conditions to trigger distinct genetic programs. After summarizing the somatic embryogenesis process, we then discussed and distinguished each of the references cited in the Office action as detailed below.

Claim Objections

Claim 10 was objected to as being in improper dependent form. Claim 10 has been cancelled and thus the objection is moot.

Rejections Under 35 U.S.C. § 103(a)

Claims 1, 5-10, 13-14, 18-23, 27, 28, 33-34, and 36-43 were rejected as unpatentable over Attree (U.S. Patent No. 6,627,441) in view of Handley (U.S. Patent No. 5,491,090). Claim 10 has been cancelled. The Examiner contends that Attree teaches a method of reproducing mature somatic embryos in all conifers, which includes culturing in media containing 3% sucrose, 30μM ABA, 10% PEG and 3.32% lactose (Table 5 and column 26, lines 35-38). The Examiner contends that this medium is used during the prematuration stage because it is used

after proliferation and before maturation. The Examiner then alleges that Handley teaches a method of regenerating *Pinus taeda* wherein the initiation and maintenance media contain a sugar selected from glucose, maltose, sucrose, melezitose and a combination thereof. The Examiner then contends it would have been obvious to one skilled in the art to reproduce coniferous somatic embryos with a nutrient medium containing lactose and an additional sugar as taught by Attree and to modify the prematuration medium as taught by Handley.

The passage and Table in Attree relied upon by the Examiner refers to a maturation medium and not an induction, maintenance or prematuration medium as recited in independent claims 1, 23 and 43 of the instant application. At column 26, line 26-32, Attree indicates that the embryos were precultured (prematuration) in $1/20^{th}$ strength hormone medium for one week prior to transfer to maturation medium and that once in maturation medium the media was changed weekly to the media indicated in Table 5. Thus, the media the Examiner points to are maturation media and not prematuration media. Handley also does not teach an induction, maintenance or prematuration medium containing lactose and an additional sugar as recited in the independent claims.

Therefore, the combination of Attree and Handley do not teach or suggest "a nutrient medium selected from the group consisting of induction medium, maintenance medium and prematuration medium, wherein the nutrient medium comprises lactose and an additional sugar" as recited in claims 1, 23 and 43. Claims 5-9, 13-14, 18-22, 27, 28, 33-34 and 36-42 all depend from claims 1 or 23 and are not obvious over the combination of Attree and Handley for at least the same reasons as stated for claims 1 and 23. Applicants respectfully request that the rejection be withdrawn.

In addition, as noted by Dr. Attree in the interview, lactose was used to produce a relatively high osmoticum in the maturation medium of Attree. In contrast to the maintenance medium, the maturation medium contains no auxin or cytokinin, has abscisic acid added and also requires some form of water stress, often in the form of an osmoticum. The osmoticum can be either a metabolizable sugar or non-metabolizable sugars, salts or other compounds. In the maturation step the genes for proliferation of the embryos are turned off and the genes for embryo development are turned on and the media requirements are distinct. In the maturation medium of Attree, lactose was used in combination with sucrose because lactose was not believed to be metabolizable by coniferous somatic embryos. Lactose is a sugar found in cow's milk and as such would be expected to be metabolized by mammals and not by plants. In a media where proliferation is the primary goal and a relatively low osmoticum and relatively high metabolizable sugar content is desired, adding lactose would not have been expected to be beneficial to the somatic embryogenesis process. Thus, for this additional reason claims 1, 5-9, 13-14, 18-23, 27, 28, 33-34 and 36-43 are not obvious in light of the combination of Attree and Handley.

Claims 50-54 were rejected under 35 U.S.C. § 103(a) as unpatentable over Fan (U.S. Patent No. 6,689,609) in view of Handley. The Examiner alleges that the phase two growth of somatic embryos in Fan requires a carbohydrate source, such as lactose in the range of 3-6% and that phase two in Fan is equivalent to the maintenance step in the current application. The Examiner acknowledges that Fan does not teach *Pinus taeda* but alleges that one of skill in the art would have been motivated to combine the teachings of Fan with those of Handley because

Pinus taeda is an important timber crop. In addition, the Examiner alleges that one of skill in the art would have had a reasonable expectation of success in the combination because the method of Fan is used with other species of pines.

Fan is drawn to a multi-step germination process as indicated at least at column 10, lines 36-37 and does not relate to the induction, maintenance or prematuration steps. The first step of the process of Fan indicates that the starting material is dessicated mature plant somatic embryos (emphasis added, see column 10, lines 43-44). Germination is the final step in somatic embryogenesis and is distinct from induction, maintenance and prematuration in that the starting material for germination is a mature somatic embryo that has completed the maturation process.

Therefore, Fan does not teach or suggest using medium comprising lactose in the induction, maintenance or prematuration steps of the somatic embryogenesis process as recited in independent claim 50. As stated above, Handley does not cure this deficiency. Claims 51-54 all depend from claim 50 and are not obvious over the combination of Fan and Handley for at least the same reasons as stated for claim 50. Applicants respectfully request that the rejection be withdrawn.

Claims 55-60 were rejected under 35 U.S.C. § 103(a) as unpatentable over Coke (U.S. Patent No. 5,534,433) in view of Pullman (U.S. Patent No. 6,492,174). The Examiner alleges that Coke teaches a method for embryo development (which the Examiner characterizes as prematuration) of *Pinus taeda*, using a combination of sucrose and maltose in the medium. The Examiner alleges that Pullman teaches initiation of *Pseudotsuga menziesii* and *Pinus radiata* embryogenic cultures in media containing 1-1.5% maltose, glucose, fructose, sucrose, galactose

or a combination thereof. The Examiner then alleges that it would have been obvious to one of skill in the art to reproduce coniferous somatic embryos in medium containing two sugars as taught by Coke and to modify the sugars by using galactose as the primary sugar as taught by Pullman.

Coke teaches initiation (induction) and proliferation (maintenance) media comprising sucrose as the sole sugar. Coke, column 6, lines 53-55. Coke does not teach a prematuration medium, but instead transfers the tissue to embryo development medium which is equivalent to maturation medium in the instant application. Coke, column 6, lines 61-63. It is the maturation medium that comprises two sugars, sucrose and maltose, neither of which is a galactose-containing sugar and not the prematuration medium as suggested in the Office action.

Claim 55 recites in part "a nutrient medium selected from the group consisting of maintenance medium and prematuration medium; wherein the nutrient medium comprises a galactose-containing sugar and an additional sugar." Thus, Coke does not teach or suggest use of more than one sugar in the maintenance or prematuration steps and also does not teach or suggest use of a galactose-containing sugar in any of the steps. Pullman does not cure the deficiencies of Coke because Pullman does not teach or suggest media for use in maintenance or prematuration and is limited to media for improving initiation (induction).

Therefore, one of skill in the art with the teachings of Coke and Pullman would not have expected a combination of a galactose-containing sugar and an additional sugar in the maintenance or prematuration steps of somatic embryogenesis to be useful. Claims 56-60 all depend from claim 55 and are not obvious over the combination of Coke and Pullman for at least

the same reasons as stated for claim 55. Applicants respectfully request that the rejection be withdrawn.

Conclusion

Accordingly, Applicants respectfully request withdrawal of the rejections and allowance of the claims. No fee is believed to be due in connection with this response. However, if an additional fee is owed, please charge such fee to Deposit Account No. 50-1965.

Date: 11/13/07

Respectfully submitted,

Charles A. Laff, Reg. No. 19,787
MICHAEL BEST & FRIEDRICH LLP
180 North Stetson Avenue, Suite 2000
Chicago, IL 60601
(312) 222-0800
(312) 222-0818 (fax)